

SATUS WATERSHED RESTORATION

9603501

SHORT DESCRIPTION:

Reestablish landscape level ecological processes disrupted by modern land uses. We are restoring normative interactions between soil, water, and vegetation necessary for creation and maintenance of the aquatic habitat essential to anadromous fishes.

SPONSOR/CONTRACTOR: YIN

Yakama Indian Nation

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GOALS

GENERAL:

Supports a healthy Columbia basin, Maintains biological diversity, Maintains genetic integrity, Increases run sizes or populations, Provides needed habitat protection, Adaptive management (research or M&E)

WATERSHED:

Implementation

NPPC PROGRAM MEASURE:

No response

TARGET STOCK

Satus Creek Summer Steelhead

LIFE STAGE

Egg to smolt

MGMT CODE (see below)

N(P)

BACKGROUND

Stream name:

Satus Creek and tributaries, excluding Mule-Dry Creek

LAND AREA INFORMATION

Subbasin:

Yakima River Basin, Satus Creek Watershed

Stream miles affected:

177

Land ownership:

Yakama Indian Nation

Acres affected:

348,000

HISTORY:

New in FY 1996, beginning July, 1996.

BIOLOGICAL RESULTS ACHIEVED:

Current baseline and historical reference conditions of important environmental and biological parameters are being established during the first funding cycle. Biological results from restoration activities focused on watershed functioning, conducted within a framework of long-term monitoring, will be characterized in future reports and technical papers.

PROJECT REPORTS AND PAPERS:

None to date.

ADAPTIVE MANAGEMENT IMPLICATIONS:

Adaptive management is central to achieving the Satus Watershed Project's restoration goals. Because the basin is entirely under the ownership of the Yakama Indian Nation and the YIN Fisheries Program is holding 5 year grazing leases to 40% of the basin, a unique opportunity exists to apply adaptive management. Small-scale, high-intensity restoration activities may be appropriate

where project boundaries, cooperation among users, or land ownership is limited. However, our restoration philosophy is to develop and apply large-scale, low input restoration techniques which are compatible with continuing current land uses, and which capitalize on natural processes and seasonal opportunity. Based on our interpretation of historical information, we are learning how land uses have contributed to fish habitat degradation. This provides a historical context for present day adaptive management prescriptions that can integrate watershed restoration and continued land management.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

The Yakama Indian Nation proposes to improve fish habitat in the Satus Creek watershed by ameliorating the effects of past and present land uses. Our measurable objectives are to reduce the ratio between peak and low flows, reduce erosion, restore natural riparian and upland vegetation patterns.

CRITICAL UNCERTAINTIES:

Weather is the critical uncertainty associated with the success of restoration activities. Various project restoration activities are designed to capitalize on a range of climatic conditions (e.g., high flow periods), however, success in manipulating the vegetation in any given year will still be dependent upon at least moderately favorable weather. The secondary uncertainty lies in the assumption that improving spawning and rearing conditions will increase steelhead numbers in the Satus Creek basin. No single project can encompass the entire steelhead life cycle; this project deals with providing a larger supply of outmigrants to benefit from downstream improvements and accelerate the stock recovery process. Mainstem river and ocean conditions are being addressed by other projects.

BIOLOGICAL NEED:

Satus Creek and its major tributaries produce nearly half the Yakima basin's wild summer steelhead, but this population has suffered an alarming decline in numbers since reservation population monitoring began in 1988. This trend is unlikely to reverse itself soon, judging by the low outmigrations of summer steelhead smolts at the Yakima River trap downstream from Satus Creek. Poor smolt production also indicates that spawning and rearing conditions are limiting steelhead populations. Management of this watershed therefore has profound implications for the Satus Creek steelhead run and, in turn, for the entire Yakima basin run.

While many factors outside the Satus Creek watershed may have contributed to the decline in anadromous fish runs, the watershed has serious problems of its own from a fisheries perspective. There are no active irrigation diversions in the Satus Creek watershed; habitat for juvenile steelhead is nevertheless limited by low summer flow in Satus Creek and most of its tributaries, and by high summer water temperature in most stream reaches below 2,000 feet elevation.

The Yakama Nation has found excessive levels of fine sediment in steelhead spawning areas. Five of the eight spawning riffles in Satus Creek analyzed in 1993 contained more than 17% fine particles, considered "poor" according to Washington watershed analysis criteria. Six tributary riffles were analyzed, and all were in the "poor" category.

Livestock grazing is an important cause of damage to Satus Creek and its tributaries. Overgrazing of vegetation and trampling of stream banks has tended to create wide, shallow, warm and sediment-laden streams. Range conditions on adjoining uplands also affect Satus Creek and its tributaries. Overgrazing has destabilized the rangeland portion of the watershed, so that rainstorms and snowmelt rapidly erode the topsoil and carry it into creeks.

In the upper portion of the watershed roads are the primary cause of damage to aquatic habitat. Logging roads discharge large quantities of sediment due to poor location, lack of surfacing and inadequate drainage. Location of roads within riparian corridors have unnaturally constricted floodplains, increasing the depth and velocity of floodwaters, erosion, and loss of structure and habitat. Upper Satus Creek, straightened and confined by a road through its floodplain, is a primary example of channel destabilization and the loss of aquatic habitat due to road construction. Low streamflow and high temperatures are also common problems in the upper watershed.

Local problems mirror the coast-wide decline in steelhead populations which has occurred in recent years. This event has prompted a petition by the Oregon Natural Resources Council for the National Marine Fisheries Service to list 111 steelhead stocks, including Yakima River summer steelhead, as threatened or endangered under the Endangered Species Act. . We have the unique opportunity to apply adaptive management techniques.

METHODS:

A. Restore grass and woody vegetation in the Satus Creek corridor. Rest alone will not bring back native vegetation to the Satus Creek corridor. We plan to seed the good floodplain soils with wild rye, and plant local woody vegetation in rocky soils. We also

need to control a 400-acre infestation of Scotch thistle. A tribal archaeologist will provide an overview of prehistoric land use, and help plan activities that do not compromise archaeological/historic values. The benefit from this task will be reestablishment of native vegetation in the Satus Creek floodplain where it has been eliminated by cropping, overgrazing and noxious weed invasion. The native vegetation assemblage is best suited to shade and protect Satus Creek, and to provide habitat for steelhead and other salmonid species.

B. Begin a program of constant patrol and maintenance of range fences in the Satus Creek watershed, coupled with trespass penalties. We plan to patrol and maintain fences on all rangelands and stream corridors we manage under this project. We will secure authority from the Agency Superintendent to fine owners of trespass livestock. The result of this task will be secure boundaries for recovering areas, preventing new damage caused by livestock trespass. This task will continue beyond fiscal year 1996.

C. Characterize and quantify streamflow. We will establish permanent stream gaging stations and reestablish discontinued gaging stations to continuously measure stream discharge for Satus Creek and its two largest tributaries, Dry and Logy creeks. This information will be compared to historical records to assess changes in the timing and quantity of flows, and to conduct flood frequency analysis. We will use a set of staff gages, crest gages, and discharge measurements to characterize the flow regimes of intermittent and ephemeral streams.

D. Characterize suspended sediment transport. We will take regular turbidity measurements at all stream gauging locations.

E. Climatological monitoring. We will establish permanent climate stations which will continuously monitor precipitation and temperature across the watershed. This information will be used to establish and monitor changes in precipitation-streamflow relationships

F. Aerial photo interpretation. Photo interpretation data will be derived from aerial photographs and low-level videography. The focus of interpretation will be expanded to include channel characteristics important to fisheries habitat, and the drainage network in the ephemeral and intermittent catchments.

G. Channel survey. We will resurvey channel cross-sections and profiles on major perennial streams in the Satus Creek watershed to evaluate channel response to high flows.

H. Characterize stream habitat conditions throughout the Satus watershed with the selection of specific stream segments (approximately 1500') following standard Washington State ambient habitat monitoring protocols (TFW). A long-term stream segment monitoring strategy will include aerial photo interpretation, channel surveying, temperature monitoring, and measurements of canopy coverage, bank stability, gravel embeddedness, large woody debris frequency, and channel habitat unit classification. These stream segments will also be targeted for site specific restoration efforts, including those detailed in this methods section (e.g. re-vegetation, burning, large woody debris placements).

I. Fisheries surveys. Quantify target fish population characteristics and habitat specific biological responses, including abundance, density, growth, and condition of life history cohorts from young-of-the-year fry to migrating smolts, including parr stages. Population characteristics and cohort fate will be compared within and among watershed tributaries. Population sampling will be conducted with snorkeling and electrofishing techniques within the stream habitat monitoring segments, as outlined above. Smolts will be sampled in the lower Satus Creek area, below all contributing tributaries, to obtain an estimate of overall Satus watershed steelhead production. The redds of spawning adults will be surveyed, as in the past, to track overall population trends and identify important spawning reaches for purposes of future conditions analysis (e.g., fine sediment composition).

J. Experimental watershed project. We will acquire and install monitoring instruments, measure channel, substrate and floodplain characteristics, and monitor survival and growth of juvenile steelhead. We will use the initial data to evaluate existing and desired conditions and plan initial restoration activities.

K. Begin large woody debris placements within habitat monitoring segments. We will identify habitat segments with large woody debris (> 20 cm dbh) in unstructured positions out of the low flow channel, and increase low flow channel complexity and cover by winching debris into position, preferably in association with other stable bank or bed material. Selected stream segments will be monitored for fish population abundance and density prior to and after placement and annually to assess the persistence or downstream transport of large woody debris placements.

L. Enhance beaver habitat by propagating riparian hardwoods. We will propagate aspen seedlings in a green house and plant them in sites suitable for beaver habitat. We will reinvigorate riparian cottonwood, willow, and aspen stands throughout the Satus Creek watershed. Additionally, where feasible, and where instream structure is entirely absent, wood posts will be pounded singly or in groups into the streambed to act as debris gatherers or in concert with large woody debris placements.

M. Plant scattered Ponderosa pine seedlings throughout the mainstem floodplains of Satus, Dry, and Logy Creeks to recreate historic distribution and enhance long term stream shade, bank strength, and high quality large woody debris.

N. Rehabilitate incised ephemeral and intermittent channels, especially in headwater meadow areas by stabilizing headcuts, constructing sediment traps to capture sediment, and revegetating to capture and stabilize sediments and promote long term, self perpetuating channel aggradation.

O. Reintegrate fire as a landscape process We will introduce prescribed fire into the Satus Creek basin, with the goals of

improving watershed functioning and restoring high quality aquatic habitat. Implementation of this fire reintroduction plan will play a vital role in ongoing long-term restoration efforts. The in-house analytic and monitoring capabilities of the YIN Department of Natural Resources will allow us to assess the cumulative effects of fire reintroduction on ecosystem functioning and anadromous fish habitat.

PLANNED ACTIVITIES

SCHEDULE:

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

s a whole; Experimentation: The concept of adaptive management implies experimentation with restoration and management techniques. Experimentation coupled with intensive monitoring may not be cost-effective on as large a scale as the entire Satus Creek watershed, however. The Yakama Nation proposes to experiment with restoration techniques in the 25-square-mile Kusshi Creek subwatershed, which comprises 4 percent of the Satus Creek watershed. Steelhead spawn in Kusshi Creek when spring runoff is average or greater than average, but extremely low summer flow, combined with damage to the channel and riparian zone, seriously impairs the creek's smolt production potential. The creek is representative of many small base-flow-dependent streams in the rangelands of the interior Columbia Basin which attract steelhead spawners but rapidly become hazardous to their progeny. The long-term survival of steelhead populations in this region may hinge on improving the productivity of watersheds which have low economic value yet play a significant Other Benefits: This project focuses on the root causes of watershed damage. The visible results of this project will be a stimulus to broaden the Nation's watershed protection efforts. New water quality regulations and an improved hydraulics code, both in the works, will strengthen these efforts. An Endangered Species Act petition for Yakima Basin steelhead and new Yakima Basin water enhancement legislation are drawing unprecedented public attention to how the Yakama Nation manages its watersheds, increasing the incentive to make this project a long-term success.

MONITORING APPROACH

nued gauging stations to continuously measure stream discharge for Satus Creek and its two largest tributaries, Dry and Logy creeks. This information will be compared to historical records to assess changes in the timing and quantity of flows, and to conduct flood frequency analysis. We will use a set of staff gages, crest gages, and discharge measurements to characterize the flow regimes of intermittent and ephemeral streams. I. Characterize and quantify suspended sediment transport. We will equip permanent stream gauging stations with continuous turbidity sampling capability. Ongoing suspended sediment concentration measurements will be used to develop turbidity/suspended sediment concentration relationships for each sampling station. We will also measure turbidity and suspended sediment at other locations throughout the stream system. Suspended sediment transport will be quantified by the product of suspended sediment concentrations and the associated discharge measurements.

RELATIONSHIPS

RELATED BPA PROJECT

5512100
8812009

RELATIONSHIP

The proposed project enhances the potential benefits of steelhead supplementation under the Yakima Fisheries Project

RELATED NON-BPA PROJECT

Satus Creek Watershed Analysis/US Department of the Interior Bureau of Indian Affairs

RELATIONSHIP

Watershed analysis provides information necessary for directing restoration activities.

OPPORTUNITIES FOR COOPERATION:

The Bonneville Power Administration is funding the Yakima Fisheries Project to begin constructing facilities in 1996 for supplementing spring chinook populations in the Yakima Basin. Planning is underway for supplementing summer steelhead in

the Satus Creek watershed and elsewhere in the Yakima Basin. The project's ultimate goal is to increase natural production of salmon and steelhead. Habitat improvements in the Satus Creek watershed will help assure that this goal will be met. Funding to lease a 12-mile corridor of riparian lands along Satus Creek for 10 years to enhance fish and wildlife was provided by the Bureau of Reclamation in 1995. Livestock exclusion fences have also been constructed along parts of Logy and Mule Dry Creeks in the Satus Creek watershed.

The Yakama Nation's Lower Yakima Valley Wetlands and Riparian Area Restoration Project is receiving \$4.9 million from the Bonneville Power Administration to purchase, restore and manage riparian lands along the Yakima River, lower Toppenish Creek, and in lower Satus Creek.

Several fire rehabilitation projects are underway in the Satus Creek watershed. Rehabilitation efforts are generally focused on revegetation and stabilization of severely burned riparian areas. Bank stabilization work along Satus Creek has been funded by the Washington Department of Transportation; the work is being planned and executed by tribal staff. The Yakima Salmon Corps has performed several revegetation projects in the Satus Creek watershed in 1995; more revegetation work is being planned for the upcoming season.

Within the forested portion of the Satus Creek watershed (25% of the total area), The 1993-2002 Yakama Nation Forest Management Plan provides for greater riparian protection and higher forest road construction standards in current and future timber harvest units. Under this plan, 57% of the forested portion is subject to timber harvest limitation to maintain winter wildlife habitat, and another 17% is designated as watershed or subalpine area with no scheduled harvest. The Yakama Nation currently spends about \$200,000 per year on road rehabilitation in the Satus Creek drainage under its timber sale program. The proposed project will be conducted on tribal lands. Federally-funded actions on tribal lands are subject to the National Environmental Policy Act (NEPA). This type of action suggests a programmatic environmental assessment. The Yakama Reservation Interdisciplinary Team reviews environmental assessments for proposed projects, recommends project changes and mitigation, and ultimately recommends for or against a Finding of No Significant Impact. This process seldom delays carefully-planned projects.

COSTS AND FTE

1997 Planned: \$200,000

FUTURE FUNDING NEEDS:

PAST OBLIGATIONS (incl. 1997 if done):

<u>FY</u>	<u>\$ NEED</u>	<u>% PLAN</u>	<u>% IMPLEMENT</u>	<u>% O AND M</u>
1998	\$218,368			
1999	\$218,368			
2000	\$218,368			
2001	\$218,368			

1997 OVERHEAD PERCENT: 24%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

[Overhead % not provided so BPA appended older data.]
